

D3H

SPACECRAFT CONTAMINATION INVESTIGATIONS

A spacecraft contamination monitor was developed for the National Oceanic and Atmospheric Administration (NOAA) environmental service satellite, scheduled for imminent launch. The tested and installed instrumentation will measure contamination from several sources: solid rocket motor plume backflow, hydrazine thrusters, and long term outgassing.

The NOAA weather satellite was selected for this experiment because two previous spacecraft of the same design encountered contamination-caused thermal control problems and systems anomalies. The JPL monitor should provide data necessary to quantify and understand the anomalies experienced by the NOAA and other scientific satellites.

Additionally, JPL developed a computerized Contamination Analysis Program (CAP) for solving large multinodal (many geometric surfaces) contamination problems in a free molecular flow environment. The low-temperature operation required for thermal control surfaces and optics makes some spacecraft extremely vulnerable to contamination. Comprehensive contamination assessments were performed for Galileo, the Infrared Astronomical Satellite (IRAS), and the Tracking and Data Relay Services Satellite (TDRSS).

Current design of these spacecraft appears capable of achieving mission objectives if CAP-recommended contamination procedures are employed in all phases of construction, ground handling, and flight operations.

Figure (opposite page): This artist's rendering (with inset cutaway drawing) shows how the JPL spacecraft contamination monitor will fit into the National Oceanic and Atmospheric Administration (NOAA) environmental services satellite scheduled for launch early in 1981.

